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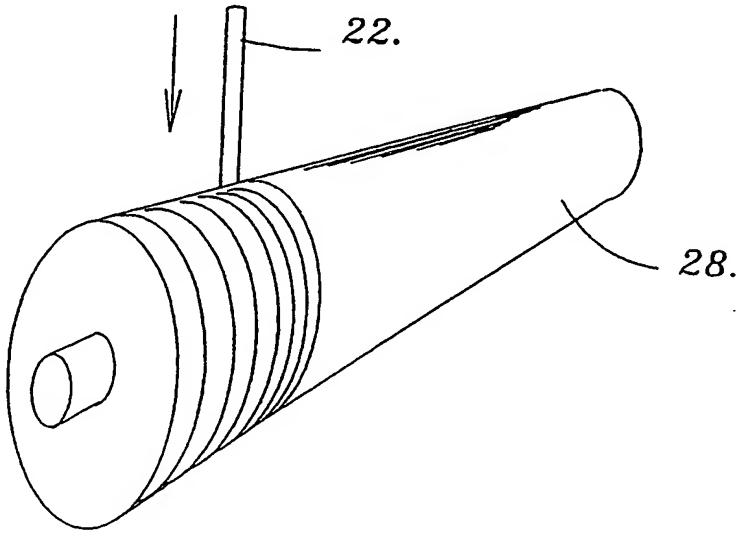
(54) Title: A METHOD OF MANUFACTURING A COVER FOR A PRESS ROLL



(57) Abstract

A method of manufacturing a cover for a press roll includes the steps of feeding epoxy matrix (10) into a container (12) and agitating the same. Filler material (16) is added to the matrix (10) while the matrix is being agitated. The matrix (10) and filler (16) are conveyed to an application zone (18). A roll (20) of reinforcing material (22) is unwound such that the unwound reinforcing material (22) extends past the application zone (18). The agitated matrix (10) and filler (16) is applied to the unwound material (22) during passage of the material past the application zone (18). The reinforcing material (22) with the matrix (10) and filler (16) applied thereto are then spirally wound around the press roll (28) such that the press roll (28) is covered with the reinforcing material (22) impregnated with the matrix (10) and filler (16). The arrangement is such that the surface characteristics of the resultant cover are dependent on the amount and type of filler material added to the matrix (10).

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PATENT APPLICATION

TITLE: A METHOD OF MANUFACTURING A COVER FOR A PRESS ROLL

Background of the Invention

Field of the Invention

The present invention relates to a method of manufacturing a cover for a press roll. More specifically, the present invention relates to a method of manufacturing a cover for a press roll which includes spirally winding reinforcing material around the press roll.

Information Disclosure Statement

In the papermaking art, a formed web is guided through a press section for removing water from the web.

Steel press rolls have been covered with rubber or synthetic material in order to enhance the water removing capability of the press.

Often, it has been the practice to add filler particles to the rubber compounds prior to application of the rubber compound to the steel roll shell in order to change the hardness of the resultant cover.

Additionally, fillers have been added to urethane in order to increase the hardness of the cover.

However, more recently, it has been found advantageous to impregnate reinforcing material with a urethane material and to spirally wind the same onto a roll shell. However, such spiral winding of the

reinforcing material does not readily permit the addition thereto of the aforementioned filler particles.

The present invention overcomes the problem of adding filler to the spirally wound reinforcing material by applying the filler to an epoxy matrix prior to the application of the mixture to the reinforcing material.

Therefore, the present invention provides a method of manufacturing a cover for a press roll that overcomes the aforementioned inadequacies of the prior art arrangements and which makes a considerable contribution to the art of manufacturing a cover for a press roll.

Other objects and advantages of the present invention will be readily apparent to those skilled in the art by a consideration of the detailed description contained hereinafter, taken in conjunction with the annexed drawings.

Summary of the Invention

The present invention relates to a method of manufacturing a cover for a press roll. The method includes the steps of feeding an epoxy matrix into a container and agitating the matrix. Filler material is added to the matrix while the matrix is being agitated, and the matrix and filler are then conveyed to an application zone. Reinforcing material is unwound from a roll such that the material extends past the application zone. The agitated matrix and filler are applied to the unwound material during passage of the material past the application zone. The reinforcing material, together with the matrix and filler, are then spirally wound around the press roll such that the press roll is covered with the reinforcing material impregnated with the matrix and filler. The arrangement is such that the surface characteristics

of the resultant cover are dependent on the amount and type of filler material added to the matrix.

In a more specific embodiment of the present invention, the epoxy matrix is a polymeric thermo-plastic matrix.

In another embodiment of the present invention, the matrix is a polymeric thermo-set matrix.

The filler material is composed of either mineral particles, synthetic particles or refractory particles.

The particles in one embodiment of the invention have a diameter less than one (1) millimeter, and in another embodiment of the present invention, the particles have a diameter of at least one (1) millimeter.

In another embodiment of the present invention, the filler material includes PTFE powder, together with glass fibers. In yet another embodiment of the present invention, the filler material includes PTFE powder, together with ceramic fibers.

Additionally, in another embodiment of the present invention, the filler material includes PTFE powder, together with quartz fibers and feldspar particles.

The reinforcing material is either a woven material, a knitted material, a braided material or a non-woven material.

The step of spirally winding the reinforcing material is carried out during the cross-linking of the matrix.

Many variations and modifications of the combination of method steps according to the present invention will be readily apparent to those skilled in the art by a consideration of the detailed description contained hereinafter. However, such modifications and variations fall within the spirit and scope of the present invention as defined by the appended claims.

Brief Description of the Drawings

Figure 1 is a schematic view representing the step of feeding the epoxy matrix into a container and agitating the same;

Figure 2 is a similar view to that shown in Figure 1, but shows filler material being added to the matrix while the matrix is being agitated;

Figure 3 is a similar view to that shown in Figure 2, but shows the agitated matrix and filler being conveyed to an application zone and being applied to reinforcing material being unwound from a roll of reinforcing material; and

Figure 4 is a perspective view showing a press roll being spirally wound with the reinforcing material and matrix and filler according to the present invention.

Detailed Description of the Drawings

Figure 1 is a schematic view illustrating a method of manufacturing a cover for a press roll shell according to the present invention. Figure 1

shows an epoxy matrix **10** disposed within a container **12**. The epoxy matrix **10** is being agitated by an agitator **14**.

Figure 2 is a similar view to that shown in Figure 1, but shows filler material **16** being added to the matrix **10** while the matrix **10** is being agitated within the container **12**.

Figure 3 is a similar view to that shown in Figure 2, but shows the agitated matrix **10** and filler **16** being conveyed and pumped via pump **P** to an application zone, generally designated **18**.

A roll **20** of reinforcing material **22** is unwound, as indicated by the arrow **26**, such that the reinforcing material **22** extends past the application zone **18**.

The agitated matrix and filler **10** and **16** are applied, as indicated by the arrow **26**, to the unwound material 22 during passage of the unwound material **22** past the application zone **18**.

Figure 4 is a perspective view of a press roll **28** and shows the roll **28** being spirally wound with the reinforcing material **22**, the matrix **10** and filler **16** having been previously applied to the reinforcing material **22**. The arrangement is such that the press roll **28** is covered with the reinforcing material **22**, which is impregnated with the matrix **10** and filler **16**. The surface characteristics of the resultant cover are consequently dependent on the amount and type of filler material **16** added to the matrix.

In specific embodiments of the present invention, the matrix **10** is either a polymeric thermo-plastic matrix or a polymeric thermo-set matrix.

The filler material **16** is either composed of mineral particles, synthetic particles or refractory particles.

In one embodiment of the present invention, the filler material **16** includes particles having a diameter of less than one (1) millimeter, and in another embodiment of the present invention, the filler material **16** includes particles having a diameter of at least one (1) millimeter.

Additionally, the filler material **16** includes either PTFE powder together with glass fibers, PTFE powder together with ceramic fibers, or PTFE powder together with quartz fibers and feldspar particles.

The reinforcing material **22** is either a woven material, a knitted material, a braided material or a non-woven material.

The step of spirally winding the reinforcing material **22** is carried out during the cross-linking of the matrix.

The present invention provides a method of manufacturing a roll cover which exhibits the required durometer hardness for the particular type of paper being pressed.

Such hardness of the cover is not only a requirement according to the type of paper being manufactured, but also a requirement according to the type of coating that will be applied thereto for subsequent calendering.

Additionally, roll covers of varying durometer hardness will be required dependent upon the type of furnish being used.

Although the present invention has been described with particular application to the provision of a cover for a press roll, it will be appreciated by those skilled in the art that such roll covers will also be applicable in soft calendering and the like.

WHAT IS CLAIMED IS:

1. A method of manufacturing a cover for a press roll, said method comprising the steps of:

feeding an epoxy matrix (10) into a container (12);

agitating the epoxy matrix (10);

adding filler material (16) to the matrix (10) while the matrix is being agitated;

conveying the agitated matrix and (10 filler (16) to an application zone (18);

unwinding a roll (20) of reinforcing material (22) such that the unwound reinforcing material (22) extends past the application zone (18);

applying the agitated matrix (10) and filler (16) to the unwound material (22) during passage of the unwound material past the application zone (18); and

spirally winding the reinforcing material (22) with the matrix (10) and filler (16) applied thereto around the press roll (28) such that the press roll (28) is covered with the reinforcing material (22) impregnated with the matrix (10) and filler (16), the arrangement being such that the surface characteristics of the resultant cover are dependent on the amount and type of filler material added to the matrix.

2. A method of manufacturing a cover as set forth in claim 1, wherein the feeding step includes:

feeding a polymeric thermo-plastic matrix into the container (12).

3. A method of manufacturing a cover as set forth in claim 1, wherein the feeding step includes:

feeding a polymeric thermo-set matrix into the container (12).

4. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding mineral particles to the matrix (10).

5. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding synthetic particles to the matrix (10).

6. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding refractory particles to the matrix (10).

7. A method of manufacturing cover as set forth in claim 1, wherein the step of adding filler material includes:

adding material having a particle size less than one (1) millimeter in diameter.

8. A method of manufacturing cover as set forth in claim 1, wherein the step of adding filler material includes:

adding material having a particle size of at least one (1) millimeter in diameter.

9. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding PTFE powder, together with glass fibers.

10. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding PTFE powder, together with ceramic fibers.

11. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding PTFE powder, together with quartz fibers, together with feldspar particles.

12. A method of manufacturing a cover as set forth in claim 1, wherein the reinforcing material (22) is a woven material.

13. A method of manufacturing a cover as set forth in claim 1, wherein the reinforcing material (22) is a knitted material.

14. A method of manufacturing a cover as set forth in claim 1, wherein the reinforcing material (22) is a braided material.

15. A method of manufacturing a cover as set forth in claim 1, wherein the reinforcing material (22) is a non-woven material.

16. A method of manufacturing a cover as set forth in claim 1, wherein the step of spirally winding the reinforcing material (22) is carried out during the cross-linking of the matrix (10).

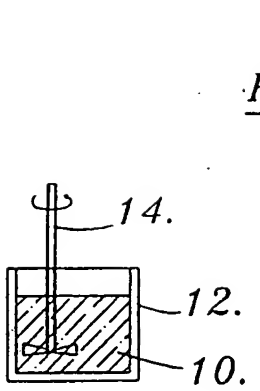

Fig. 1.

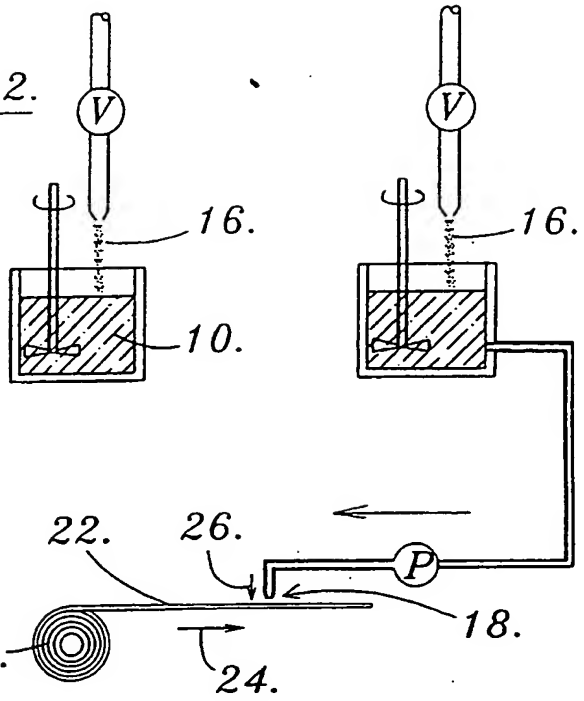

Fig. 2.

Fig. 3.

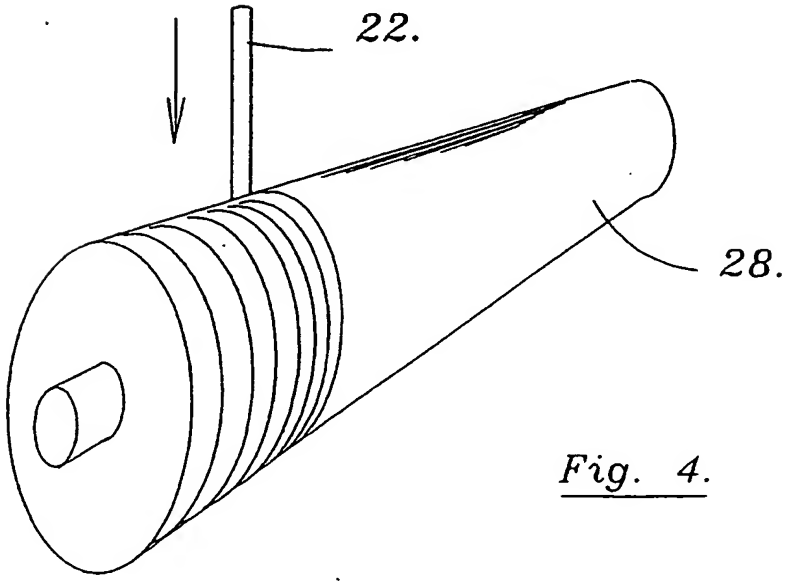

Fig. 4.

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/US 93/08537

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 D21F3/08 D21G1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 D21F D21G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB,A,2 057 092 (YAMAUCHI RUBBER) 25 March 1981 see the whole document ---	1,3-6, 12,15
A	EP,A,0 146 342 (KERN RUBBER COMPANY) 26 June 1985 see the whole document ---	1-3,12, 13
A	US,A,3 069 304 (E. FAHRBACH ET AL) 18 December 1962 see the whole document ---	1,3,16
A	EP,A,0 487 477 (VALMET PAPER MACHINERY) 27 May 1992 ---	
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
GB-A-2057092	25-03-81	JP-C-	1263049	16-05-85
		JP-A-	56028312	19-03-81
		JP-B-	59036133	01-09-84
		AU-B-	518775	22-10-81
		AU-A-	6109480	12-02-81
		CA-A-	1157757	29-11-83
		DE-A,C	3029288	26-03-81
		FR-A,B	2462997	20-02-81
		SE-B-	453062	11-01-88
		SE-A-	8005593	11-02-81
		US-A-	4368568	18-01-83
EP-A-0146342	26-06-85	US-A-	4576845	18-03-86
		CA-A-	1255529	13-06-89
US-A-3069304		NONE		
EP-A-0487477	27-05-92	CA-A-	2054383	20-05-92
DE-A-2330565	17-01-74	AU-A-	5710673	19-12-74
		BE-A-	800545	01-10-73
		CA-A-	975204	30-09-75
		CH-A-	577642	15-07-76
		GB-A-	1422809	28-01-76
		NL-A-	7307841	21-12-73
		SE-B-	402879	24-07-78
		US-A-	3800381	02-04-74